THE PRACTICALITY OF TEACHING MATHEMATICS IN SHONA IN THE ZIMBABWEAN PRIMARY SCHOOLS

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ABSTRACT – This study aims to explore the feasibility of teaching mathematics in Shona in Zimbabwean primary schools. The teaching of mathematics in indigenous languages as early as the infant stage in Zimbabwe was justified by the Ministry of Education based on the understanding that pupils are capable of expressing mathematical ideas freely if their native language is used for instruction. However, in Zimbabwe, despite Shona being one of the local languages spoken by most learners, the decision has provoked disagreements and contentions among educators. It is in this regard that the possibility of teaching mathematics in Shona is investigated. The study is informed by the qualitative approach of research, through interviews and observations to capture the concerns and perceptions of primary school teachers about the issue under discussion. The study found that there is a mismatch between the ministry's expectations, the teaching context and the recognition that Shona is receiving in the education system of Zimbabwe. The study recommends that appropriate materials be availed to support the use of Shona to teach mathematics at infant level, practitioners receive appropriate training to implement the curriculum and that Shona should be adequately recognised in all sectors of the country.

Keywords: Curriculum, mathematics, Shona, English, primary schools, language

INTRODUCTION AND BACKGROUND

The purpose of this study is to explore the practicality, significance and contribution of teaching mathematics in Shona to the development of mathematical knowledge of infants in Zimbabwean primary schools. The study of teaching Mathematics in indigenous languages has emerged to be favourite for analysis by most researchers in Zimbabwe because the concern of which language to use for teaching and learning is indeed a crucial one in multilingual contexts (Jegede, 2011). According to Lee (2006), pupils may think that they do not know a certain concept in mathematics, when what they cannot do is to express the idea in a certain language. The ministry of Education in Zimbabwe therefore introduced the teaching of mathematics in indigenous languages on the basis that pupils can express mathematical ideas better and freely if their local language is used for instruction. Studies by UNESCO (2003) pointed out that instruction in the first language is beneficial to success in other subject areas including mathematics. Chivhanga (2014) also concurred that children who begin their education in local language, make a better start, have confidence and will continue to perform better. This implies that the first approaches that a learner makes towards mathematics learning are important for future learning. The ideas alluded to above show that if Shona is used to introduce concepts as early as the infant stage, children become capable of making well-informed decisions, which is likely to curtail the learners' academic impairment in future. Hence, Chivhanga (2014) asserted that mother tongue (Shona) should be promoted to enhance concept formation among learners who grapple with the acquired language (English).

In contrast however, despite Shona being one of the local languages popular among learners, the decision to enforce the teaching of mathematics in Shona by the Ministry induced contentions among educators (Maponga 2017- Herald reporter). Hence, most Zimbabweans, according to Chivhanga (2014) prefer English language as the medium of instruction in education. Some scholars such as Moschkovich (2012) also argue that instruction in mathematics should pay attention to enhancing mathematical reasoning and not accuracy in using a language, suggesting that language has limited contribution in the acquisition of mathematical knowledge. Mathematics is a specialised second language and should therefore be presented to the students in second language (Jones, et al., 2008). Like any other language, mathematics has its own didactics and symbols peculiar to mathematics. Studies by Jegede (2011) have shown that learners fail mathematics due to specialised concepts such as "quotient, divisor, denominator, standard deviation, to mention a few, which may not be

well explained either in first or second language. To support this, Kan and Bulut (2015) assert that mathematics has concepts that are beyond the capabilities of native languages. This may suggest that attempting to interpret and transcribe mathematical concepts in Shona is likely to distort the real meaning of the ideas being taught. The debate around this topic left most Zimbabweans asking themselves; ***"Can mathematics be taught in local languages?"*** It is against this background that the possibility of teaching mathematics in Shona in the primary schools of Zimbabwe is investigated. The study was guided by the following research questions: 1. What are the teachers' perceptions about teaching mathematics in Shona in the Zimbabwean primary schools? 2. How feasible is it to teach mathematics using Shona as a medium of instruction in the Zimbabwean primary schools?

CONCEPTUAL FRAMEWORK

This study is premised on the view that the acquisition and development of children's mathematical knowledge in the early stages of learning is based on the language used as the medium of instruction (Edmonds-Wathen et al., 2016). To support this idea, Vukovic and Lesaux (2013) aver that language ability is essential for children's mathematical development and that learners' mathematical difficulties may reflect deficient linguistic process. Warren, Cooper and Baturo's (2004) study also revealed that many indigenous learners have difficulties when learning mathematics and that the language background of these learners can impact significantly on all educational outcomes. Hence, Vukovic and Lesaux (2013) aver that the abstract symbols inherent in mathematics can be conceptualised by learners through language proficiency. This implies that it is through the language used for instruction that mathematical ideas are conceptualised. Dutro and Moran (2003) narrate the metaphor of bricks and mortar to explain the connection between mathematics content at infant level and the language used to communicate it. The bricks represent the mathematics content such as symbols, shapes, etc and the mortar represents the ordinary language that connects or joins the content symbols in order for the (symbols) to make sense to the learners. This means without proper mortar (language), mathematical concepts remain cluttered and unconnected in the minds of the children. The study hence, seeks to explore the possibility of teaching mathematics in Shona in the Zimbabwean primary classrooms.

LITERATURE REVIEW:

Language Perceptions in Mathematics Teaching

UNESCO (1953, p. 8) posit, "one can admit that the best vehicle of teaching is the mother tongue of the child." However, even though Shona is the language spoken by most learners in primary schools in Zimbabwe, the language has not assumed much significant role in the classroom (Chivhanga, 2014). According to Chivhanga, Zimbabwe adopted a language policy from its colonisers which marginalised the use of indigenous languages. As a result, English language has remained a prestige-laden language, held at high esteem. It has also been considered as the most appropriate language to be used for instruction in all the subjects learnt in primary schools, including mathematics. Howard and Perry (2019) argue that the notion of poor performance can sometimes be devastating, especially if the accepted views of success held by one group, reinforce failure in another. This idea may suggest that failure to understand some mathematical concepts because of language deficiencies of one group imposes an unfair advantage on the learners who learn the subject in the first language. According to Kyeyune (2003, p. 173), "the effectiveness of teaching or learning at any level depends on the effectiveness of communication between the teacher and the learner." This suggests that mathematics may be effectively taught if it is packaged in an appropriate language. To support this, Salami (2008) also asserts that the language of instruction enhances or impedes the quality of education. Jegede (2011) hence, proposes that the language used for instruction can be a problem if the concepts taught are not in the learner's home language. This means mother tongue helps develop children's abilities in school and provides greater understanding of what they learn. However, Jegede (2011) recommends that mathematical concepts can be learnt effectively if English language is supplemented with the

learners' home language (code-switching). Scholars like Edmonds-Wathen (2015) and Warren et al. (2004) have also written much about the benefits of using indigenous languages to teach mathematics at early stages of schooling. The topic has been prevalent among researchers but one would wonder whether this is feasible in reality or has just remained as an intended goal of this idea. The major question however, is; can Shona be effectively used as a medium of instruction in mathematics lessons in Zimbabwe? The study therefore seeks to contribute to a repertoire of mathematics knowledge by suggesting ways to improve and develop infants' mathematical knowledge through a language at the early stages of learning.

METHOD

Sample & Research Procedures

The study is informed by the qualitative approach of research exclusively, which incorporates observations and focus group interviews with primary school teachers in Zimbabwe. Purposive sampling where the researcher made a conscious decision regarding the school teachers that would provide the desired information, was used. The study targeted infant teachers (Grade 1 to 3) in government urban and rural schools. Four primary schools in Harare (2 from low density areas (LDA) and another 2 from high density areas (HDA)) and 1 school in the rural areas of Mashonaland Central province were considered for the research interviews and observations. Participants at each school formed one focus group for teacher interviews. With the ethical approval from the Ministry of primary and secondary education in Zimbabwe, a total of 13 teachers from three districts were interviewed. The interviews were used to depict the teachers' perceptions, anticipations, feelings, experiences and the ways in which they make sense of the process of teaching mathematics using Shona as a medium of instruction. Subsequent to the interviews, 5 teachers from those that were interviewed, were observed teaching mathematics in order to understand and depict the successes, benefits and/or challenges of teaching and learning mathematics in a particular language. Data from interviews and lesson observations were audio recorded and transcribed. Field notes were also written from interviews and lesson conversations. The features, impact and the implications of the language used in teaching mathematics were discussed. All names used in this paper are pseudonyms.

RESULTS AND DISCUSSIONS

Teachers' perceptions and Use of Indigenous Languages

This study found that the language used for mathematics instruction was varied across the schools as determined by the school locations. Data collected from the interviews and lesson observations revealed that the way most teachers conducted themselves, in terms of language use in teaching mathematics in the high density, rural and low density areas was disparate. This implies that the teachers' decisions regarding the language to use when teaching mathematics in the primary schools were informed by the learners' prior learning and by the dynamic nature of language in the pupils' classrooms. Hence, the Queensland Indigenous Education Consultative Body (QIECB), (2003) asserted that the background of the learner has a pivotal impact in determining the language to be used in the classroom as well as educational outcomes.

When teachers were asked to state and give reasons for use of a particular language, most teachers in the low density area (LDA) schools indicated that they would prefer English language. They explained that they only use Shona in the case where children have difficulties understanding a concept. However, they argued that pupils in their areas did not have problems with English language and that the learners actually liked the language. In addition, the schools also encouraged the use of English language in the classrooms. The following remarks illustrate one of the grade 2 teachers, Lilian's views on this issue.

> "I teach in English. I only introduce Shona phrases where pupils have problems. ….Yes, the pupils do understand English because they start learning English from ECD, especially from this community. Our catchment area is an English speaking community. When I give a test like

> this one here (*showing the test*) it is in English and they are supposed to read it as it is. So I teach them in English so that they are able to read it.….parents are flocking to this school, (*looking for places*) because children are taught in English, and the school is proud about it."

Vee, a grade two teacher from another school, concurred.

> "I prefer English language. I use Shona when necessary. The pupils show interest in English language. English is also encouraged by the school. Parents have a negative attitude towards Shona. They want their children to be taught in English."

Lilian's speech suggests that English speaking schools are associated with high quality learning. Both Vee and Lilian raised sensitive issues about the schools and parents' perceptions towards

Shona as a language of instruction. According to Chivhanga (2014, p. 40) "The success of using Chishona as a medium of instruction in the teaching of mathematics in primary schools depends on people's attitudes and desire to actually implement it." The feelings expressed imply that instruction in Shona may become futile in teaching mathematics because of the negative attitudes from the implementers and parents.

The teachers further explained the advantages of using English over Shona. Joanne, a grade 1 teacher from a HDA school said that children become marketable in industries, universities and internationally if they are proficient in English language, hence she would prefer English over Shona. By and large, the interview conversations with the teachers revealed that most teachers were against the use of Shona in the classroom because English is regarded very highly in the country. Such views may not support the use of Shona as a medium of instruction in teaching mathematics. According to Chivhanga (2014), English language has remained a highly regarded language, in Zimbabwe. It is a language that permits entrance into the industry and universities and ultimately, proficiency in the language is associated with better opportunities in life and better side of knowledge. Gudhlanga (2005) also infers that most people in Zimbabwe have negative attitudes towards the use of African languages as languages of instruction in education because children are required to pass English in order to obtain a full "O" level certificate. This is likely to impact negatively on the significance of Shona in education, particularly at infancy level.

Chivhanga (2014, p. 60) hence, wrote, "Each language to be used must serve a purpose, otherwise there would be no justification for human, material and financial resources expended on teaching a language for its sake…" Now, if Shona is lowly regarded in the country, the purpose of using it in mathematics may be defeated. These deliberations were also supported by the lesson observations done. Lilian, Vee and Charity taught their lessons in English and pupils responded very well.

However, Tendai, a grade 1 teacher from the same school as Lilian, preferred to teach mathematics in both English and Shona, that is, teaching a concept in English and repeat it in Shona for understanding (Code-switching). She however agreed that her pupils understood English and they enjoyed the language. Tendai remarked as follows:

> "They can speak English very well but they do not understand English instructions. They are happy when teaching them in English but English only is what gives them problems. So I mix…."

The idea of code-switching was assented to by most teachers in the rural and HDA schools. Chips a grade 2 teacher in the HDA had this to say;

> "I will introduce a mathematics lesson in English and repeat in Shona. The pupils understand simple English. So you use both languages but more inclined to English. Complete Shona does not come out properly."

Most teachers who were of the idea of mixing the languages had several reasons that included better understanding of concepts and concurrent learning of both languages. Code-switching was also found to be helpful in teaching mathematics effectively as indicated by the observations result where students (with a poor English background) were participating more

in the lessons where both Shona and English were used. Jegede (2011) hence, contends that code-switching is a useful way of transferring knowledge to the leaners in a multi-lingual mathematics classroom. However, the conversations with the participants show that Shona was only used as a second option when English fails. This implies that in the case where pupils had no problems with instructions or conception, English language would be used throughout the lesson. The problem with code-switching for these classes, however was time shortage to cover a topic.

The research observations also established that some learners with the rural background were struggling to answer questions in English, some never attempted to use English, worse still understanding the concepts taught in the adopted language. The inability to share a language (English) fluently made communication between the teacher and the pupils difficult. Hence, the teachers resorted to using Shona in the classrooms to facilitate learning. Susan, a grade 2 teacher from the rural areas said:

> "They understand Shona better than English. I sometimes try to teach in English but they understand better in Shona. We mix with a bit of English but I use Shona most of the time."

The fact that the less privileged children understood Shona better than English, whilst the better privileged ones were also better in English, denotes Shona as a lowly esteemed language in the country. This assessment is likely to kill the desire to learn mathematics in Shona. After being asked to explain the challenges they experienced in teaching mathematics in indigenous language, the concerns raised by teachers in general included the translation of terms from

English to Shona. Lilian had this to say;

> "It is difficult to translate English terms like 'mass, division, quarter, etc to Shona. How can you put that in Shona? Like right now, I am teaching comparisons, 'light, lighter, lightest', they are difficult to explain in Shona."

Charity supported the idea by saying;

> "Some words are difficult to interpret, for example, sum, fraction and many more. Some of these terms confuse the pupils when you try to define them in Shona for the pupils. It is better if I say 'half' (1/2) than to say '*cheka nepakati'* (cut in the middle). How would you explain 2/3?"

Joanne, a grade one teacher is also of the same opinion. She retorted,

> "…… look here, (showing a text book), its written 'ordinal numbers'. You want to convert this to Shona, *hatipiwi interpretation yacho in Shona* (we are not given the shona interpretation)….."

The problems portrayed by the teachers exhibit the vocabulary limitations in Shona to explain the mathematical concepts. This means Shona tends to lack the terms, structures and categories used to teach school mathematics, which suggests that resorting to Shona consistently may curtail understanding of some mathematical concepts.

The other challenge that was raised by all the participants was the discord that existed between the language expected to be used to teach mathematics (Shona) to the infants and the language in the text books used for reference. Whilst the teachers were encouraged to use Shona as the medium of instruction, the text books were all written in English, and the assessment was done in English. Although Mutasa (2003) asserts that learning takes longer when using a foreign language than in the mother language, the results of the interviews and the observations revealed that pupils taught in Shona found it hard to link the concepts taught in Shona to the questions asked in English, and consequently, the learning process became equally long. Shirley remarked;

> "Yes, they say teach in Shona but the tests are set in English. Like grade 1, second term, they write the tests in English. If you concentrate with Shona, how will the pupils perform? It confuses the pupils"

Despite using Shona to teach mathematics, Shammy and Joanne concurred that they had challenges with the exercises that were given in English while students are taught in Shona.

The results of the observations also revealed that sometimes language has very little impact on the development of mathematics knowledge among infants. During observation, one of the teachers, Joanne, was teaching the topic 'Money". She was teaching the concept that 10cents can be made up of different denominations of money, for example, 10c = 1c +1c + 1c + 1c + 1c + 1c + 1c + 1c + 1c + 1c. Or 10 cents = 2 'five cent coins', that is 10c = 5c + 5c, etc. Pupils were given different coins in groups and were taught in Shona with some bit of English. Towards the end of the lesson, the researcher (R) had some conversation with the pupils to test understanding.

R: How many one cent coins make 10 cents? [*in English*]

Student A: 3, B: 10, C: 2, D: 1

Only four students (A, B, C, D) responded to the question and the rest were quiet. It was assumed that the students' lack of the English language fluency stifled their understanding. Hence, no feedback was given before the same question was asked in Shona;

R: *Ma cent mangani anotipa 10cents/anowanikwa mu 10cents* [*In Shona*]

Again, only 3 pupils wrongly responded to the question and the rest looked confused. The failure to get the right answers after the question had been asked in both languages could be ascribed to the misconception of ideas, which could be due to the methodology used and not necessarily the language used. The same trend was observed in the other two lessons observed. The observations point to the fact that the development of mathematics knowledge is not always impaired by the language used in the classroom. Charity and Vee were in consensus when they explained that they also had cases where children understood both languages (English and Shona) but still failing to perform well.

The study further found that in some of the schools where mathematics was taught in English, the teachers were somewhat side-tracked by the improper use of English language by the learners and tended to focus more on the language than the learning of mathematics. The following excerpt is an example of the conversation that was observed in one of the lessons with the grade 2s.

Teacher (Vee): What is 3(4) (*meaning 3 sets of 4*,)? Someone to illustrate on the board.

Student: We make 3 sets and then counted…….. (*teacher interjected*)

Teacher: No, 'and then count…….'

Student: We makes 3 sets…….

Teacher: Say, 'we make……and then count'

The conversation went on a little bit longer because the student continued to make some grammatical mistakes whilst the teacher continually tried to correct her language. The teacher was focussing more on the appropriateness of the English used than the mathematics concepts to be learnt. According to Moschkovich (2012), instruction in mathematics should focus on enhancing mathematical reasoning and not accuracy in using a language, which suggests the teacher was supposed to focus more on the concept being illustrated. That would save time to cover adequate mathematics content within the mathematics period. The implication of this finding is that language should not be the focal point in teaching mathematics, as long as the child has basic knowledge of the language to communicate the mathematical concepts.

Teachers were also asked about their general views towards the "updated Curriculum" in the Zimbabwean schools. Their sentiments exhibited dissatisfaction across all the subjects including mathematics. The teachers' feelings showed that there were still some inadequacies in the updated curriculum that needed to be spruced up. They mentioned inadequate training to implement the curriculum, textbook shortages (Some schools only had the teacher's copy in a class of 35 students), lack of follow-ups to ensure the curriculum was being properly implemented and the use of Shona was also not supported by the textbooks available.

CONCLUSION AND RECOMMENDATIONS:

The study found that whilst the use of indigenous languages can be a prudent idea to facilitate the learning and teaching of mathematics to infants, the teachers view the education system in Zimbabwe as inadequately equipped for the implementation of such a curriculum because of the unavailability of supporting materials, lack of skills to implement the curriculum and the low recognition that Shona is receiving in education as a medium of instruction. The study also established that the success of using Shona as a medium of instruction in the teaching of mathematics in primary schools depends on practitioners' attitudes and desire to actually implement it. This study hence recommends that the language used to teach mathematics should be supported by the materials available. Bamgbose (1991, p. 72) wrote "No matter how large the population of speakers of a language is, it is only when the language has been reduced to writing and materials made available in it, that it can be used in education." Lack of supporting materials makes it difficult to use Shona in teaching and learning school mathematics. The use of Shona in teaching mathematics also needs to include the consideration by the ministry of whether the implementers are well prepared for their role and whether what they are required to achieve is feasible.

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